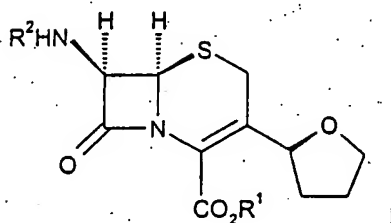
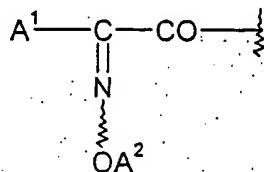


# CLAIMS

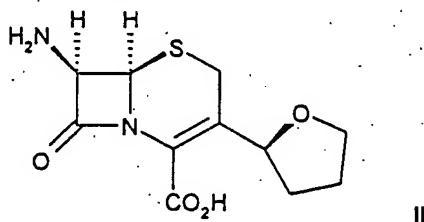
1. A process for preparing a 3-cyclic-ether-substituted cephalosporin of the formula I:



- 5 or a pharmaceutically acceptable salt thereof,  
wherein  
the group CO₂R¹ is a carboxylic acid or a carboxylate salt; and  
R² has the formula:



- 10 wherein  
A¹ is selected from the group consisting of C₆-10aryl, C₁-10heteroaryl and C₁-10heterocyclyl;  
A² is selected from the group consisting of hydrogen, C₁-6alkyl, C₃-10cycloalkyl, C₆-10aryl, C₁-6alkyl(CO)(C₁-6alkyl)-O-, HO(CO)(C₁-6alkyl), mono-(C₆-10aryl)(C₁-6alkyl),  
15 di-(C₆-10aryl)(C₁-6alkyl), and tri-(C₆-10aryl)(C₁-6alkyl);  
comprising reacting a compound of formula II:



with a compound of the formula III:

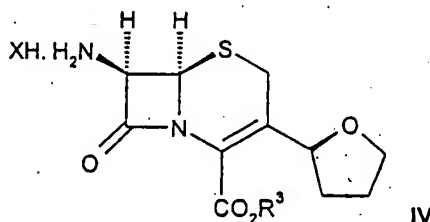


- 20 wherein  
R² is as defined above; and  
L is selected from the group consisting of hydroxy, halo, azido, mono(C₁-6alkyl)carbonate, (C₁-6alkyl)carboxylate, (C₆-10aryl)carboxylate,

mono-(C<sub>6-10</sub>aryl)(C<sub>1-6</sub>alkyl)carboxylate, di-(C<sub>6-10</sub>aryl)(C<sub>1-6</sub>alkyl)carboxylate,  
 di(C<sub>1-6</sub>alkyl)phosphorothioate, (C<sub>1-6</sub>alkyl)sulfonyl, mono-(C<sub>1-6</sub>alkyl)(C<sub>6-10</sub>aryl)sulfonyl,  
 di-(C<sub>1-6</sub>alkyl)(C<sub>6-10</sub>aryl)sulfonyl, (C<sub>1-6</sub>alkyl)-(CO)-S-, cyano-C<sub>1-6</sub>alkoxy, C<sub>6-10</sub>aryloxy,  
 3-benzthiazolyloxy, 8-quinolinylloxy and N-oxy-succinimidyl;

5 in the presence of a solvent, a base, an optional coupling agent and an optional catalyst.

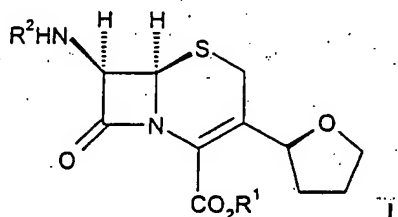
2. The process according to claim 1 further comprising the step of preparing said compound of formula II by reacting a compound of formula IV:



10 wherein R<sup>3</sup> is para-nitrobenzyl or allyl; and X is halo;

with a suitable deprotecting agent; in the presence of a solvent.

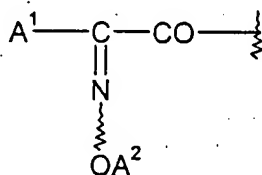
3. A process for preparing a 3-cyclic-ether-substituted cephalosporin of the formula I:



15 or a pharmaceutically acceptable salt thereof,

wherein the group CO<sub>2</sub>R<sup>1</sup> is a carboxylic acid or a carboxylate salt; and

R<sup>2</sup> has the formula:



20 wherein A<sup>1</sup> is selected from the group consisting of C<sub>6-10</sub>aryl, C<sub>1-10</sub>heteroaryl and C<sub>1-10</sub>heterocyclyl;

A<sup>2</sup> is selected from the group consisting of hydrogen, C<sub>1-6</sub>alkyl, C<sub>3-10</sub>cycloalkyl, C<sub>6-10</sub>aryl, C<sub>1-6</sub>alkyl(CO)(C<sub>1-6</sub>alkyl)-O-, HO(CO)(C<sub>1-6</sub>alkyl), mono-(C<sub>6-10</sub>aryl)(C<sub>1-6</sub>alkyl), di-(C<sub>6-10</sub>aryl)(C<sub>1-6</sub>alkyl) and tri-(C<sub>6-10</sub>aryl)(C<sub>1-6</sub>alkyl);



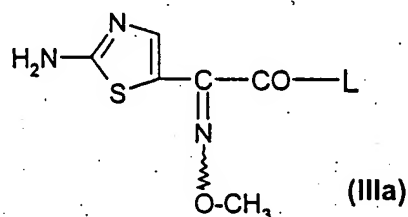
in the presence of a solvent.

- 5        5.        The process according to claim 1, wherein said A<sup>1</sup> moiety of said R<sup>2</sup> is C<sub>1-10</sub>heteroaryl selected from the group consisting of furyl, thienyl, pyridyl, aminothiazolyl and aminothiadiazo-  
lyl, wherein said amino moiety of said aminothiazolyl or aminothiadiazo-  
lyl is optionally protected.

6.        A process according to claim 1, wherein said A<sup>2</sup> moiety of said R<sup>2</sup> is C<sub>1-8</sub>alkyl.

7.        A process according to claim 1, wherein L of said compound of the formula III is selected from the group consisting of halo, methanesulfonyl, diethylphosphorothioate and 3-benzthiazolyloxy.

- 10       8.        A process according to claim 1, wherein said compound of formula III has a formula IIIa:



and wherein L is selected from the group consisting of halo, methanesulfonyl, diethylphosphorothioate and 3-benzthiazolyloxy.

- 15       9.        A process according to claim 1, wherein said solvent is water, acetone, tetrahydrofuran, ethyl acetate, dimethylacetamide, dimethylformamide, acetonitrile, methylene chloride, 1,2-dichloroethane or mixtures thereof.

10.       A process according to claim 1, wherein said solvent is water, acetone, or mixtures thereof.

- 20       11.       A process according to claim 1, wherein a catalyst is used.

12.       A process according to claim 11 wherein said catalyst is a Lewis acid catalyst selected from the group consisting of boron trihalide and aluminum halide.

13.       A process according to claim 1 wherein said base is diisopropylethylamine or sodium hydroxide.

- 25       14.       A process according to claim 1, wherein said coupling agent is selected from the group consisting of N,N'-diethylcarbodiimide, N,N'-dipropyl carbodiimide, N,N'-diisopropylcarbodiimide, N,N'-dicyclohexylcarbodiimide, N-ethyl-N'-[3-(dimethylamino)propyl]carbodiimide, N,N'-carbonyldiimidazole and N,N'-carbonyldithiazole.

- 30       15.       A process according to claim 1, wherein said coupling agent is N,N'-dicyclohexylcarbodiimide.

16.       A process according to claim 1, wherein said X is chloro.

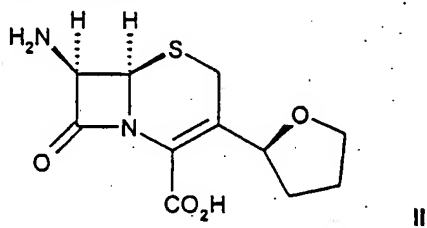
17. A process according to claim 2, wherein said  $R^3$  is para-nitrobenzyl and said suitable deprotecting agent is sodium dithionite or a catalytic hydrogenating agent.

18. A process according to claim 2, wherein said  $R^3$  is allyl and said suitable deprotecting agent is tetrakis triphenylphosphine palladium (0).

5 19. A process according to claim 17, wherein said solvent is acetone, water, tetrahydrofuran or mixtures thereof.

20. A process according to claim 4, wherein said solvent is methylene chloride, tetrahydrofuran or mixtures thereof.

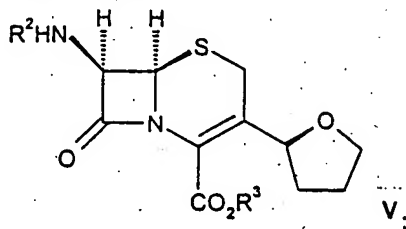
21. A compound of formula II:



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22. The compound according to claim 21 wherein said compound of the formula II has an enantiomeric or diastereomeric purity of 96% to 100%.

23. A compound of formula V:



15 wherein  $R^2$  is acyl; and  $R^3$  is para-nitrobenzyl or allyl.

24. The compound according to claim 23 wherein said compound of the formula V has an enantiomeric or diastereomeric purity of 96% to 100%.